

Claims

- [c1] 1. A method for performing geometric dimension and tolerance stack-up analysis for an assembly, the method comprising:
 receiving a target assembly dimension for stack-up analysis, wherein said assembly includes at least one part;
 receiving a feature corresponding to said part;
 receiving feature tolerance data associated with said feature, wherein said feature tolerance data includes at least one of size tolerance and geometric tolerance;
 accessing stack-up rules in response to said receiving feature tolerance data, wherein said stack-up rules include:
 instructions to determine if a form tolerance, an orientation tolerance and a profile tolerance should be included in a stack-up tolerance for said feature;
 and
 formulas to calculate a nominal dimension and said stack-up tolerance for said feature when said feature tolerance data applies to feature of sizes;
 deriving said nominal dimension and said stack-up tolerance for said feature responsive to said stack-up rules and to said feature tolerance data; and
 performing said stack-up analysis in response to said nominal dimension and to said stack-up tolerance, wherein said performing results in a mean and a standard deviation for said target assembly dimension.
- [c2] 2. The method of claim 1 wherein said feature tolerance data includes both said size tolerance and said geometric tolerance.
- [c3] 3. The method of claim 2 wherein said geometric tolerance includes at least one of a geometric tolerance applied to features tolerance and a geometric tolerance applied to features of sizes tolerance.
- [c4] 4. The method of claim 1 wherein said instructions include:
 determining if said feature tolerance data includes said size tolerance, said form tolerance, said orientation tolerance and said profile tolerance;
 calculating said nominal dimension and said stack-up tolerance utilizing said size tolerance in response to said determining resulting in finding that said size

tolerance is included in said feature tolerance data;
calculating said nominal dimension and said stack-up tolerance utilizing said profile tolerance in response to said determining resulting in finding that said size tolerance is not included in said feature tolerance data and that said profile tolerance is included in said feature tolerance data;
calculating said nominal dimension and said stack-up tolerance utilizing said orientation tolerance in response to said determining resulting in finding that said size tolerance and said profile tolerance are not included in said feature tolerance data and that said orientation tolerance is included in said feature tolerance data; and
calculating said nominal dimension and said stack-up tolerance utilizing said form tolerance in response to said determining resulting in finding that said size tolerance, said profile tolerance and said orientation tolerance are not included in said feature tolerance data and that said form tolerance is included in said feature tolerance data.

- [c5] 5. The method of claim 4 wherein said formulas include:
updating said nominal dimension and said stack-up tolerance utilizing a geometric tolerance applied to features of sizes tolerance in response to said feature tolerance data including said geometric tolerance applied to features of sizes tolerance.
- [c6] 6. The method of claim 5 wherein said geometric tolerance applied to features of sizes tolerance includes a stack-up cross the feature tolerance.
- [c7] 7. The method of claim 6 wherein said stack-up cross the feature tolerance includes a straightness feature of size tolerance, a parallelism feature of size tolerance, a perpendicularity feature of size tolerance, an angularity feature of size tolerance, or a concentricity/symmetry tolerance.
- [c8] 8. The method of claim 5 wherein said geometric tolerance applied to features of sizes tolerance includes a stack-up from the data tolerance.
- [c9] 9. The method of claim 8 wherein said stack-up from the data tolerance includes a positioning tolerance, a circular run-out tolerance or a total run-out

tolerance.

- [c10] 10. The method of claim 5 wherein said utilizing said geometric tolerance applied to features of sizes tolerance includes accessing a table of formulas for deriving said nominal dimension and said stack-up tolerance.
- [c11] 11. The method of claim 10 wherein said table is indexed by a type of material condition, a type of feature and a type of geometric tolerances applied to features of sizes.
- [c12] 12. The method of claim 11 wherein said type of material condition includes maximum material condition, least material condition and regardless of size.
- [c13] 13. The method of claim 11 wherein said type of feature includes an external feature and an internal feature.
- [c14] 14. The method of claim 11 wherein said type of geometric tolerances applied to features of sizes includes a stack-up cross the feature and a stack-up from the datum.
- [c15] 15. The method of claim 1 further comprising outputting said mean and said standard deviation for said target assembly dimension.
- [c16] 16. The method of claim 1 wherein said outputting is in a report format.
- [c17] 17. The method of claim 1 wherein said target assembly dimension, said feature and said feature tolerance data were input using an input wizard tool.
- [c18] 18. A system for performing geometric dimension and tolerance stack-up analysis for an assembly, the system comprising:
 - a network; and
 - a host system in communication with said network, said host system including software to implement a method comprising:
 - receiving a target assembly dimension for stack-up analysis over said network, wherein said assembly includes at least one part;
 - receiving a feature corresponding to said part over said network;
 - receiving feature tolerance data associated with said feature over said network,

wherein said feature tolerance data includes at least one of size tolerance and geometric tolerance;
accessing stack-up rules in response to said receiving feature tolerance data, wherein said stack-up rules include:
instructions to determine if a form tolerance, an orientation tolerance and a profile tolerance should be included in a stack-up tolerance for said feature;
and
formulas to calculate a nominal dimension and said stack-up tolerance for said feature when said feature tolerance data applies to features of sizes;
deriving said nominal dimension and said stack-up tolerance for said feature responsive to said stack-up rules and to said feature tolerance data; and
performing said stack-up analysis in response to said nominal dimension and to said stack-up tolerance, wherein said performing results in a mean and a standard deviation for said target assembly dimension.

- [c19] 19. The system of claim 18 wherein said network is an intranet.
- [c20] 20. The system of claim 18 wherein said network is the Internet.
- [c21] 21. The system of claim 18 further comprising a user system in communication with said network and wherein said target assembly dimension, said feature corresponding to said part and said feature tolerance data are received from said user system over said network.
- [c22] 22. A computer program product for performing geometric dimension and tolerance stack-up analysis for an assembly, the computer product comprising:
a storage medium readable by a processing circuit and storing instructions for execution by the processing circuit for performing a method comprising:
receiving a target assembly dimension for stack-up analysis, wherein said assembly includes at least one part;
receiving a feature corresponding to said part;
receiving feature tolerance data associated with said feature, wherein said feature tolerance data includes at least one of size tolerance and geometric tolerance;
accessing stack-up rules in response to said receiving feature tolerance data,

instructions to determine if a form tolerance, an orientation tolerance and a profile tolerance should be included in a stack-up tolerance for said feature;
and

deriving said nominal dimension and said stack-up tolerance for said feature responsive to said stack-up rules and to said feature tolerance data; and

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